

CLAIMS

What is claimed is:

- 1 1. A circuit for transforming a singled-ended signal to a differential signal for use by
2 an RF power amplifier suitable for transmitting signals in an RF communication system
3 comprising:
4 a silicon semiconductor device;
5 an RF power amplifier formed on the semiconductor device;
6 a transformer formed on the semiconductor device, the transformer having a primary side
7 with first and second terminals, and a secondary side with first and second
8 terminals coupled to the RF power amplifier; and
9 wherein an RF input signal is coupled to the first terminal of the primary side of the
10 transformer, and wherein a reference node is coupled to the second terminal of the
11 primary side of the transformer, producing a differential RF signal at the first and
12 second terminals of the secondary side of the transformer.
- 1 2. The circuit of claim 1, wherein the silicon semiconductor device is a
2 complimentary metal-oxide semiconductor (CMOS) device.
- 1 3. The circuit of claim 1, wherein the RF communication system is a cellular
2 telephone system.

1 4. The circuit of claim 1, wherein the reference node coupled to the second terminal
2 of the primary side of the transformer is a ground node.

1 5. The circuit of claim 1, further comprising a pre-driver circuit coupled between the
2 transformer and the power amplifier.

1 6. The circuit of claim 5, wherein the pre-driver circuit further comprises a limiting
2 amplifier.

1 7. The circuit of claim 6, wherein the limiting amplifier includes a string of
2 inverters.

1 8. The circuit of claim 6, wherein the limiting amplifier includes an amplifier
2 coupled between the limiting amplifier and the transformer.

1 9. A method of transforming a singled-ended RF signal to a differential RF signal in
2 an RF power amplifier comprising the steps of:
3 providing a silicon semiconductor device;
4 forming an RF power amplifier on the semiconductor device;
5 forming a transformer on the semiconductor device, the transformer having a primary
6 side with first and second nodes, and a secondary side with first and second
7 nodes;

8 coupling a single ended RF input signal to the first node on the primary side of the
9 transformer and coupling an RF ground signal to the second node on the primary
10 side of the transformer to generate a differential RF signal at the first and second
11 nodes on the secondary side of the transformer; and
12 coupling the first and second nodes of the secondary side of the transformer to the RF
13 power amplifier.

1 10. The method of claim 9, wherein the silicon semiconductor device is a CMOS
2 device.

1 11. The method of claim 9, wherein the RF power amplifier is suitable for use in an
2 RF communication system.

1 12. The method of claim 11, wherein the RF communication system is a cellular
2 telephone system.

1 13. An RF power amplifier suitable for transmitting signals in an RF communication
2 system comprising:
3 a silicon semiconductor device;
4 a power amplifier formed on the semiconductor device, the power amplifier having an
5 input and an output; and
6 a preamplifier stage coupled to the input of the power amplifier, wherein the preamplifier
7 stage further comprises a transformer coupled between the input of the power

8 amplifier and an RF input node, and wherein the preamplifier stage is formed on
9 the semiconductor device.

1 14. The RF power amplifier of claim 13, wherein the preamplifier stage further
2 comprises a limiting amplifier coupled to the transformer.

1 15. The RF power amplifier of claim 14, wherein the limiting amplifier further
2 comprises a plurality of series coupled inverters.

1 16. The RF power amplifier of claim 14, wherein the preamplifier further comprises a
2 DC feedback loop.

1 17. The RF power amplifier of claim 13, wherein the power amplifier is comprised of
2 a plurality of amplifying stages.

1 18. The RF power amplifier of claim 13, wherein the RF communication system is a
2 cellular telephone system.

1 19. The RF power amplifier of claim 13, wherein the silicon semiconductor device is
2 a CMOS device.

1 20. A method of converting an RF input signal from a first ground potential to a
2 second ground potential for use with an RF power amplifier comprising the steps of:
3 providing a silicon semiconductor device;
4 forming an RF power amplifier on the semiconductor device;

5 providing a first input node;
6 providing a second input node;
7 forming a transformer on the semiconductor device, the transformer having a primary
8 side and a secondary side, wherein a first terminal of the primary side of the
9 transformer is coupled to the first input node, and wherein a second terminal of
10 the primary side of the transformer is coupled to the second input node;
11 coupling the first input node to an RF signal and the second input node to a first ground
12 potential to generate an RF signal at a first terminal of the secondary side of the
13 transformer and a second ground potential at a second terminal of the secondary
14 side of the transformer; and
15 coupling the first and second terminals of the secondary side of the transformer to the RF
16 power amplifier.

1 21. The method of claim 20, wherein the silicon semiconductor device is a CMOS
2 device.

1 22. The method of claim 20, wherein the RF power amplifier is suitable for use in an
2 RF communication system.

1 23. The method of claim 22, wherein the RF communication system is a cellular
2 telephone system.